



Forest Grazing, Silvopasture, and Turning Livestock into the Woods

Introduction

Grazing in forests and woodlands has a long history in North America. It includes historic bison and elk grazing in savannas, Native Americans wintering horses in wooded river bottoms, early settlers using pigs to grub for acorns, and horses grazing in the pinyon pine/juniper lands of the southwest. As with these early land uses, modern woodland grazing approaches vary in their input requirements, risks and potential benefits.

Farmers and ranchers need to consider how to manage each acre so that it improves production without degrading the natural resource foundation, particularly as land development continues and pressures on agricultural lands intensify. This Agroforestry Note seeks to define forest grazing, silvopasture and turning livestock into the woods and discusses the similarities and differences in management goals, intensity, risks and benefits between these three different land uses.

Forest Grazing is a management practice that can be successfully implemented in many parts of North America. It is based on ecological principles for the specific forest community. Management skill requirements are high, as are risks of short-term and long-term failure. Managers must be able to recognize the key understory forage species and understand the correct level of herbivory on these plants. Knowledge of the regeneration process for desired tree species, as well as the herbivore/plant interactions that will ensue, is necessary. However, there are a number of economic and environmental benefits to be realized.

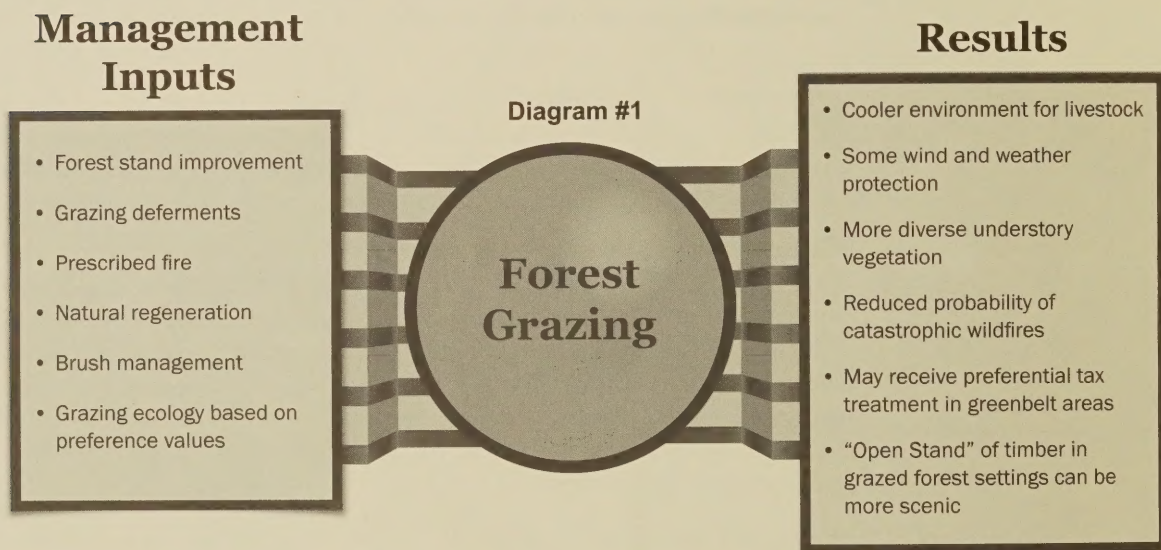
Silvopasture is a management activity that can be successfully implemented in many parts of North America. Management skill and labor requirements are high. Risk of short-term and long-term environmental failure is also high if the system is not managed properly. Managers must determine suitable overstory woody species, compute forage availability, balance livestock numbers and grazing rotations accordingly, and must understand herbivore/plant interactions generated by the higher stock density (of livestock) afforded by agronomic management. Knowledge of tree canopy management needs, blow down potentials, and control of sapling damage are a must. Numerous economic and environmental benefits can be realized.

Turning Livestock into the Woods is a land use activity with less structured management goals, which, when not properly applied, leads to degradation of resources. However, the practice is still widely utilized across North America. It can entail brief, monitored, access-controlled grazing periods when soil conditions are favorable for livestock traffic with reasonably acceptable environmental results; or long-term, livestock loafing access with no computations of forage availability or consideration for tree health, soil health or forest regeneration with unacceptable, negative environmental impacts. The long-term results from this type of management are typically poor from both economic and environmental standpoints.

Management Overview

Forest Grazing (as depicted in Diagram #1) is based on the ecological principles that drive a natural system to move toward or maintain a desired ecological site. Typical management practices may include (but are not limited to) grazing deferments based on selected forage and browse availability, prescribed fire, forest improvement that drives the forest ecologically toward a desired outcome, herbivory that doesn't detract from the desired natural regeneration or ecological site needs, biological or chemical brush management, and livestock grazing intensity based on key forage plant preferences for the grazing season. The desired plants are only grazed to the degree that still allows for them to have the desired dominance level in the plant community. Forage preference values are currently derived from manager's experience, the USDA Ecological Site Information System (for some sites), or extension service experience and documentation.

With good management, the native or naturalized plant community is strategically grazed and browsed when the canopy is more open, allowing more light to reach the forest floor. As the forest matures, canopy closure reduces the understory herbaceous and shrubby components until grazing is no longer feasible. For most ecosystems, canopy cover exceeding 50% results in inadequate forage for forest grazing. Some of the potential inputs and benefits of forest grazing are depicted in the following diagram:



Silvopasture management (as depicted in Diagram #2) is based on the agronomic and forestry principles used to profitably produce and harvest forage and forest products, guided by the limitations and potential of the land. Typical management practices may include (but are not limited to) soil amendment applications (usually fertilizer and lime), pasture renovations, rotational grazing management based on total forage production, chemical and mechanical weed management, tree pruning, hay harvest, tree protection and forest thinning for proper canopy management.

Silvopastures can be created by either planting trees into pastures or thinning stands of trees and planting forages. In either case, silvopasture managers coordinate tree thinning and pruning practices to modify the canopy density in ways that complement sustained forage production throughout the majority of the rotation and meet the needs of canopy species. Tree species are selected that have an economic potential and meet forage light requirements. Forages are selected that thrive in the range of sunlight penetration that is anticipated with the given canopy management. The forest management, pasture management, and grazing management is conducted in harmony, enhancing the production of multiple, harvestable components.

Management Inputs

- Canopy management
- Tree protection
- Weed control
- Soil amendment
- Hay harvest
- Tree pruning
- Rotational grazing
- Pasture renovation
- Grazing management based on total forage production

Diagram #2

Silvopasture

Results

- Diversification of income streams
- Shorter forest rotations
- Shaded, cool season forage plants can be more nutritious for livestock
- Improved plant nutrition uptake
- High value woodland products from active limb management
- Cooler environment in summer for livestock
- Some wind and weather protection

Turning Livestock into the Woods (as depicted in Diagram #3) is usually based on the need for additional forage or browse, to rest other pastures and sometimes just the need to reduce environmental stress on animals. Livestock managers may choose to utilize woodlots or forests as loafing lots for animals that simply need some place to be for a short while. They may also choose to turn livestock into the woods for short durations to help control invasive plants. These areas can sometimes provide temporary shade, winter wind protection, or low-quality roughage for dry cows. Depending on the geographical region, the species and stage of tree maturity, and soil characteristics, a forest may recover adequately from a single, temporary grazing period. However, when a relatively large number of cattle have uncontrolled access to forest for long periods of time, timber production and forest attributes will almost always degrade.

Management Inputs

Results

Brief/ Temporary

- Monitor ground cover and soil moisture
- Short-term access only
- Fence
- Defer site when wet
- Protect sensitive, valuable trees

Diagram #3

Turning Livestock into the Woods

- Ground cover maintained and compaction avoided if briefly utilized only when soil condition is dry or frozen
- Wind and weather protection
- Cooler environment in summer for livestock
- Low quality roughage available for dry cows when carefully managed
- Reduce invasive plant competition

Extended/ Long Term

- Long-Term access, uncontrolled access

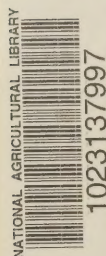
Positive

- Cooler environment in summer for livestock

Negative

- Transport of pasture nutrients to forested, loafing areas
- Concentration of livestock parasites, bacteria, and disease organisms
- Tree mortality (especially certain species) with high-density stocking
- Degraded understory and resultant increase in erosion
- Diminished or eliminated regeneration of high quality trees
- Reduced timber value due to physical damage and increased disease due to root damage

Additional Considerations



Before implementing silvopasture, forest grazing, or turning livestock into the woods, consider the potential for livestock poisoning when livestock enter a new foraging area. In addition to poisonous plants that animals may know to avoid in open pastures, there may be poisonous plants that occur predominantly in the forested portion of the landscape, such as bracken fern, hemlock, chokecherry, plants of the nightshade family, acorns (seasonal), snakeroot, black cherry and black locust. In addition to these plants, also be on the lookout for oleander, coral ardesia, coffee senna, marsh marigold, mountain laurel, and sheep laurel in the south and eastern parts of the country. The western forested areas have milkvetch, ponderosa pine needles, spring parsley, tansey ragwort, and some lupines that possess properties. There are numerous other toxic plants that livestock may encounter. Other toxic plants that livestock consume in wooded areas may suddenly become toxic after an environmental event, such as wilted cherry leaves on broken branches after a wind storm. Livestock producers should always become familiar with potentially dangerous flora throughout the wooded areas.

In addition to these livestock considerations, give thought to the impact that grazing management will have on the plant, soil, and water components of the ecosystem. Some ecological sites are highly productive, and extremely resilient when impacted by disturbances such as intensive grazing, mechanical brush control, or even tillage. On the other extreme are ecological sites that are fragile, sensitive to disturbances, and might never recover from even light grazing, or prescribed fire. Of course, most ecological sites are somewhere in between these extremes. Resource managers, professionals, and good stewards of the land will evaluate the effects that will alter the plant, animal, soil, and water resources at their disposal while practicing any of these three grazing management approaches.

Additional Information

“National Range and Pasture Handbook.” USDA Natural Resources Conservation Service, Section 600.0501 Managing Grazed Forest Lands, Pp. 5.1-155.1-20

“The Biology of Silvopastoralism.” Sharrow, Steven H., 1997. Agroforestry Notes #9, USDA – National Agroforestry Center, Pp. 1-4

“Silvopasture: An Agroforestry Practice.” Clason, T. A., Sharrow, S.H., Garrett, G., Anderson, B. E., Klopfenstein, N. B., Rietveld, W. J., and Carman, R. C. 1997. Agroforestry Notes #8, USDA – National Agroforestry Center, Pp. 1-4

“An Ecological Perspective, Foraging Behavior, and Ecosystem-level Processes” from Grazing Management, An Ecological Perspective. Briske, D. D., Heitschmidt, R. K., Stuth, J. W., Archer, S., and Smeins, F. E. 1993. Pp. 11-26, 65-84, 109-140

“An Introduction to Agroforestry.” Ramachandran Nair, P. K. 1993. Chapter 25.3.2 Pp. 454-461

“Responses of Large Herbivores to Spatial Heterogeneity in Ecosystems, and The Impacts of Livestock Grazing on Biodiversity in Natural Ecosystems” from Nutritional Ecology of Herbivores. Hobbs, N. T., and Landsberg, J., O’Conner, T., and Freudenberger, D. 1999. Pp. 97-129, 752-777

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